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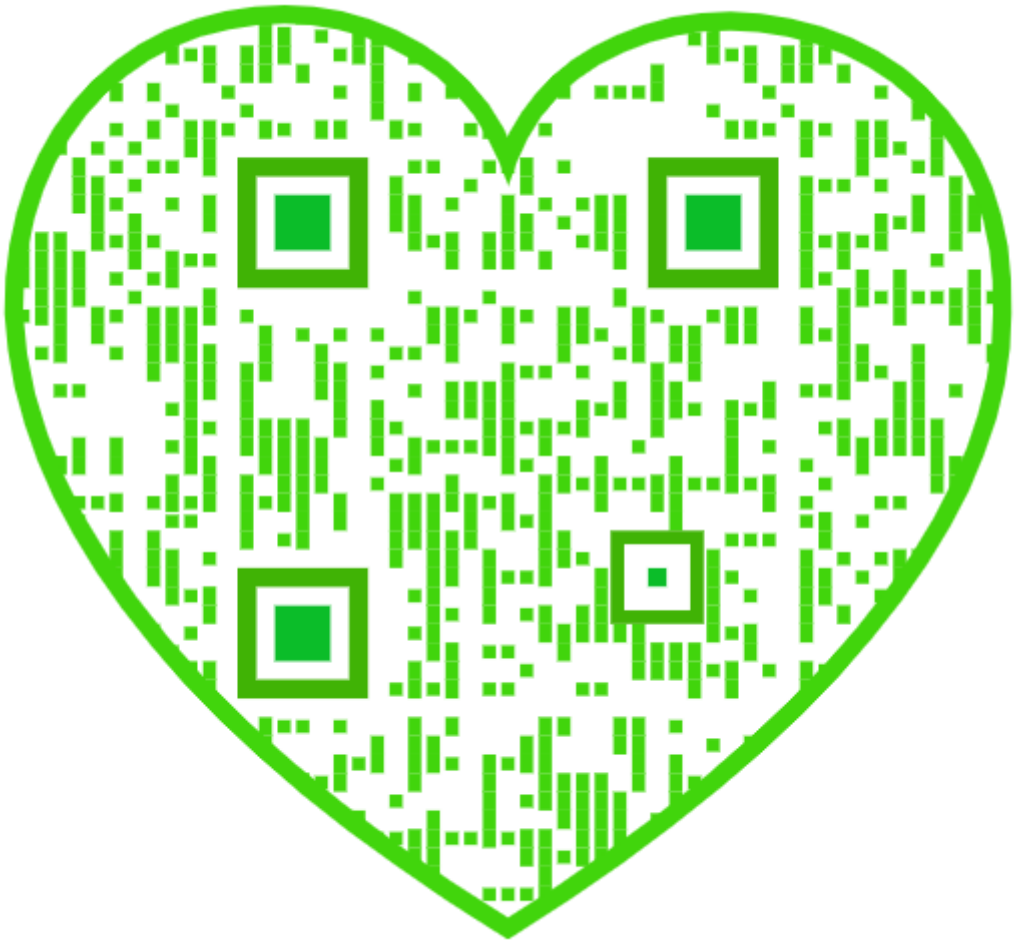
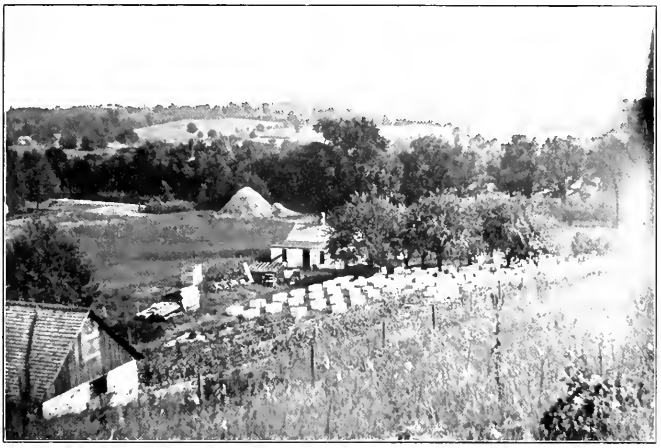


Class
Book

BEE PRIMER

FOR THE PROSPECTIVE BEEKEEPER

By C. P. DADANT
Editor of the American Bee Journal



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HANDLING BEES

The fear of stings is the greatest hindrance to the popular keeping of bees. Were it not for this, bees would be found on farms as commonly as poultry, for their honey is one of the most delicious of Nature's products.

Yet, there is VERY LITTLE DANGER OF STINGS when bees are properly handled. A little smoke, provided by the use of a BELLOWS SMOKER (Fig. 1), at the entrance of the hive and over the combs when opening a hive will render the bees tractable. Bees do not sting when filled with honey. Like a man who has just eaten a good meal, they feel peaceable. Frightening them with smoke, before opening the hive, will cause them to fill themselves with honey in anticipation of ejection from their home. Keeping smoke within reach after that will secure a quiet behavior in ordinary circumstances. You are in no more danger from a properly managed hive of bees than you would be from the heels of your favorite horse or from the horns of a gentle milch cow. Bees may be handled without smoke, but a novice should use smoke until he has become an expert.

Fig. 1. Bellows Smoker.

Fig. 5. Bee Veils.

A BEE VEIL (Fig. 5) should be used to protect the face in case of accident and gloves (Fig. 3) may be worn, but the latter make your actions clumsy. We do not recommend their use.

When you go among the bees avoid wearing black or woolen clothes. White or light colored cotton clothes are best, for cotton is a vegetable fibre, familiar to bees, while wool is an animal product and is therefore disliked by them. Have your coat off and wear a straw hat (Fig. 4).

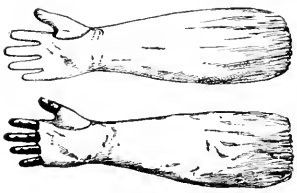
Fig. 3. Gloves with and without fingers.

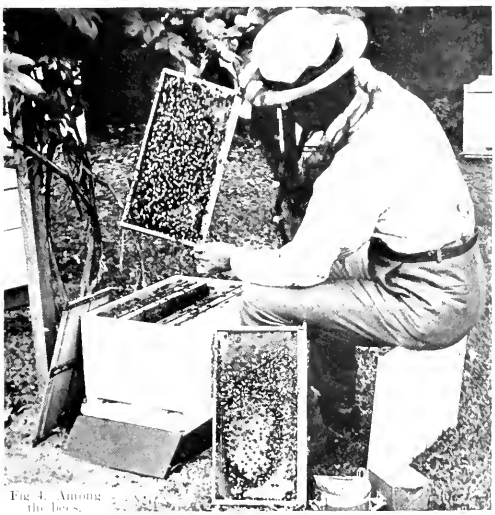
Fig. 4. Among the bees.

Fig. 2. Ready for business.

Bees returning from the fields, or flying about fields, are not prone to sting. Those leaving the hive

or performing duties at the hive, are the only ones that need be feared. Do not carelessly jar the hive, or strike at them or fight them, but go about quietly and avoid unnecessary quick motions or standing in the line of their flight to and from the hive.

Fig. 6. Not afraid of bees

NATURAL HISTORY

The honey-bees are scientifically classed in the hymenoptera, because, like the wasps, hornets and bumble-bees, they have four membraneous gauzy wings. The scientific name of the common or black bee is "apis mellifica," owing to her production of honey from the nectar of flowers, which she gathers. A slight chemical change is made in the nectar while in the honey-sack of the bees, but its color, flavor and quality remain the same. Syrup, glucose or molasses, if fed to bees, would not change in appearance, and clover honey does not resemble either alfalfa, basswood, spanish needles, sage or buckwheat honey, or honey-dew. The latter is a product of plant-lice, and is of very low quality.

The place where bees are kept is called an APIARY and the bee-keeper APIARIST.

Bees originally lived in hollow trees, clefts of rock, etc. The habitation which men provide for them is a BEE-HIVE.

There are three different kinds of inhabitants in a bee-hive, the QUEEN, the WORKERS, the DRONES.

Fig. 7a. Queen.

THE QUEEN (Fig 7a) is the only perfect female in the hive, she is the mother and lays all the eggs. This is her only duty, and so well does she perform it, that she deposits, at some seasons, especially in spring, as many as 3,500 eggs in 24 hours. The eggs are carefully laid at the bottom of each cell. She mates only once in her life, about six days after her birth, in the fields, on the wing. She never after that leaves the hive, except with a swarm. Her life's duration is from two to five years. Usually after the second or third year her fertility decreases. A queen which has been prevented from mating by accidental confinement to the hive for a period of about three weeks after birth, is no longer able to mate, but she can still lay eggs that will hatch. These, however, will produce only drones. This ability to lay eggs that produce life without impregnation belongs only to a few insects, and is called "parthenogenesis."

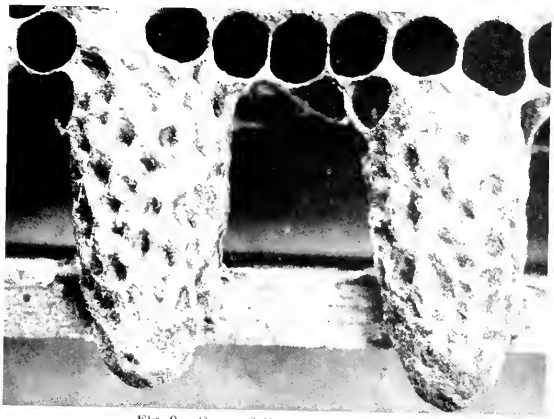

Fig. 9. Queen Cells, greatly enlarged.

The queens hatch in a queen-cell, a peculiar shaped cell hanging like an acorn cup from the combs. (Fig. 9.)

There is but one queen in each hive at one time, except when new ones are raised for swarming or when an old

queen is being superseded or replaced by the bees, when two or more queens may exist in the hive at one time. In ordinary circumstances, queens fight each other to death.

THE WORKERS (Fig. 7b) are the most numerous inhabitants of the bee-hive, as also the smallest. They number from a few thousand up to eighty thousand or more. They do what their name implies, build the combs, rear the brood by feeding it and keeping it warm, harvest the honey, chase intruders away and keep the hive clean. They ventilate their home in the summer by the fanning of their wings and cluster together for warmth in the winter. They have short, thick, smooth manibles that enable them to tear the corolla of flowers and to build their combs out of soft wax, but they have no teeth like wasps or hornets. They are therefore UNABLE TO CUT THE SMOOTH SKIN OF ANY KIND OF SOUND FRUIT.

Fig. 7b. Worker.

Bees have five eyes, three small round eyes in a triangle at the top of the head, called "ocelli," and two large composite eyes formed of thousands of facets, one of these large eyes on each side of the head. The latter enable them to see at a distance, the former enable them to see within the hive, on the combs, in the dark.

They have FOUR WINGS, two on each side of the corslet or second segment of the body. These wings fold over each other to enable them to enter within the cell where the brood is hatching. They have THREE PAIRS OF LEGS, also fastened to the second segment of the body. On the last or rear pair of legs of the workers, a small cavity, called the pollen basket, enables them to carry home the pollen of flowers, which some people, who see them so loaded, imagine to be wax, but which is used to make the pap for the young. It is popularly called bee-bread and is the fertilizing dust of flowers.

The HONEY-SAC, or first stomach, is located in the abdomen or third segment of the body of the worker-bee. The ovaries, or egg pouches, which are very large in the queen, are almost absent in the workers, who are therefore incomplete females and unfit for mating, although they may occasionally be able to lay a few eggs which hatch as drones. On the other hand, the sting, which is curved in the queen and used only to fight other queens, is straight in the worker and accompanied by a much better developed poison sac, which deposits venom in the wound made.

The worker may live as long as six months or more in the winter, when she is not flying about, but in summer her life is very short, averaging less than forty days. She literally wears herself out.

THE DRONES (Fig. 7c) are the largest inhabitants of the hive. They are reared in spring or summer and are usually killed as soon as the crop fails. When any of them are noticed in a hive after the honey crop is ended, it is an almost sure sign that the hive is queenless. They are the males, do not work at anything, feed on the stores within the hive and spend the pleasant hours of the day flying about for pleasure and in search of queens. The drone dies in the act of mating, and only one or two drones are needed to fertilize the young queens of each colony. But they are numerous, sometimes a thousand or more, so that the young queen may readily meet one in the field. The drones of one or two hives are ample for an apiary of hundreds of colonies, and it is always best to replace with worker combs as much as we can of the drone comb within the hives from which we do not wish to breed.

Fig. 7c. Drone.

The EGGS, which are laid by the queen, hatch into grubs, or larvae, within three days. At that time any larva that would hatch into a worker may be changed to a queen by their enlarging the cell containing it, a worker-cell, into a queen-cell (Fig. 9), and feeding it plentifully of the best larval food prepared by the workers. That is why a hive which has been made queenless may rear another queen, provided it has eggs, or brood, in worker-cells, less than three days old. Dozens of queen-cells (Fig. 9) are often built by the bees in such an emergency, or in preparation for swarming.

DURATION OF DEVELOPMENT OF THE BROOD, FROM THE EGG TO THE PERFECT INSECT.

		Queen.	Worker.	Drone.
In the egg	Days	3	3	3
Growth of larva	Days	5½	6	6½
Spinning of cocoon	Days	1	1	1½
Period of rest	Days	2	2	3
Change in chrysalis or pupa	Days	1	1	1
Change to winged insect	Days	3½	7	9
Average duration of changes		16	21	24

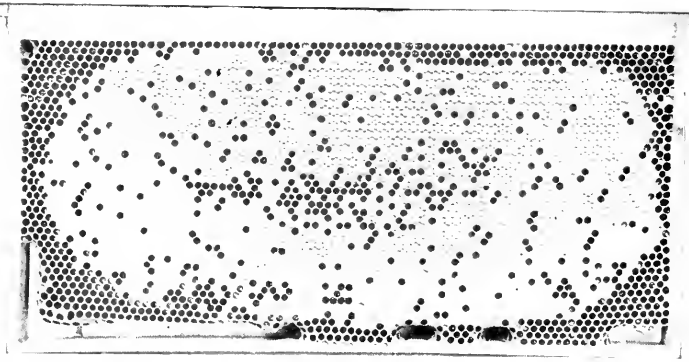

Fig 11. A Frame of Sealed Brood.

The COMB, hanging downward from the ceiling of the hive, are built by the workers, of beeswax, produced by eating honey, much as animals produce fat, and are thus quite expensive, both in labor and material. The cells in which the workers hatch, measure about five to the inch from wall to wall; those of the drones about four to the inch; those of the queens, resembling acorn cups, are built as occasion demands. About twenty-seven cells for workers and eighteen for drones, are found on each side of comb, for every square inch. When combs are filled, they are sealed by the bees.

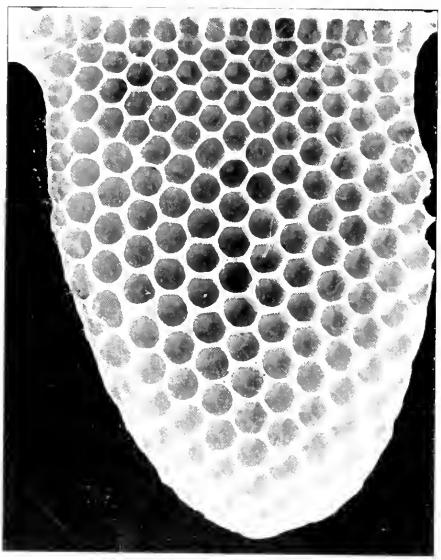

Fig. 12. A New Comb, Worker and Drone Cells.

COMB FOUNDATION

(Fig. 13) has been invented to help the bees, by supplying them with the BASE OF THE COMB made of their own product, beeswax. The rudiments of worker-cells are printed on both sides. It helps to secure straight combs in brood frames and in the little honey sections, saves much labor and material to the bees and helps to prevent the building of much drone comb. Thus three very positive advantages are derived from its use.

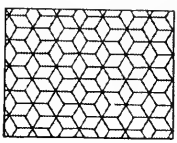

Fig. 13.
Comb Foundation.

PROPOLIS

or bee-glue, is gathered by the bees on their legs, as is the pollen, and is used to close up the cracks and crevices. It is gathered from the gum of several trees, is very sticky in warm weather and brittle in winter, and entirely prevents the use of drawers or tight-fitting implements within the hives, when such implements are left in their reach during the late summer or fall. For this reason the most simple hives are the best. The combination formed by the bees, the combs and the hive, is called a COLONY. The bees, without hive, combs or honey, are called a SWARM.

THE BEE-HIVE

The modern bee-hive is composed of the following parts: (Fig. 14, next page.)

Floor, known to bee-keepers as BOTTOM.

Living room, known as BROOD-CHAMBER or BODY, in which the bees rear their brood, keep the pollen, and should have sufficient amount of honey for their needs in all seasons. Store room or SUPER, in which the bees store the surplus honey which we take away from them. This super may be for COMB HONEY or for EXTRACTED HONEY,

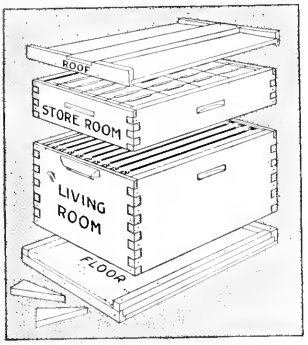

Fig. 14. Main Parts of a Bee Hive.

and is slightly different in each case. Several supers may be piled on top of each other during a good honey harvest. The bees must have the free access of all at THAT time.

Roof or COVER, which should fit on either the body or the different tiers of supers. For convenience, all parts should fit on any of the hives, so as to be interchangeable. Nothing is more inconvenient than to have two or more different sizes of hives in an apiary.

The BROOD-FRAMES (Fig. 15) are wooden frames or racks, in which the combs are suspended separately so that the bee-keeper or apiarist may be able to take a hive of bees entirely apart and examine every nook, to ascertain the conditions, hunt for the queen, take away or exchange brood or honey and do all the manipulations that may suit his method or his fancy. It must be borne in mind that modern hives are a progress because of the insight they give us into the bee-hive, which is no longer a closed book as it was centuries ago. The man who buys modern hives and does not avail himself of the manipulations they permit, may as well go back to the box hives of his grandfather.

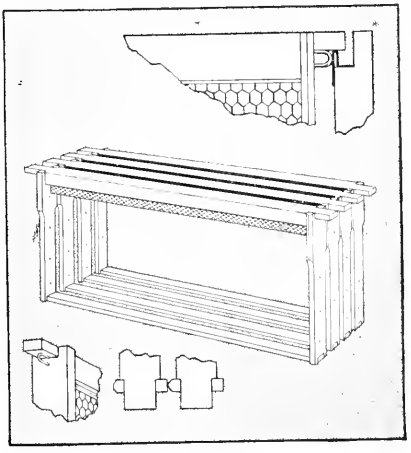

Fig. 15. Brood Frames.

The brood frames are placed from 1⅜ to 1½ inches apart from center to center. Eight and ten-frame hives are principally used in this country, and the most popular frame in use is the Langstroth. During the summer, the combs in the brood chamber or body are filled mainly with brood, pollen and a little honey, but as fall approaches less brood is reared and honey enough to winter the colony is usually stored by them in the upper part of the combs and in the rear. They never place their honey between the cluster or group and the entrance, because it would be too much in reach of robber-bees.

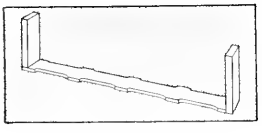

Fig. 16. Section Holder.

The SECTION-HOLDER (Fig. 16) is just what its name signifies. It is a contrivance to hold the sections in place within the super.

The SECTIONS, or honey boxes (Fig. 17) are little square frames placed in the super to be filled with honey during the harvest (Fig. 18, next page). The sections are from 1⅛ to 2 inches from center to center, the ordinary size being 1⅞. They are usually made in one piece of smooth lumber, of pliable material like basswood, and folded. They are provided with a strip of very thin comb foundation by the apiarist. A guide is indispensable, for the combs must be built straight and in the center of the sections, otherwise they would be unmanageable and difficult to ship without breakage.

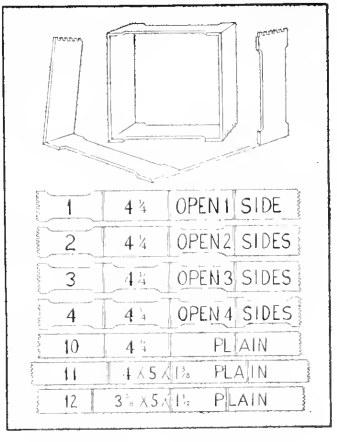

Fig. 17. Sections or Honey Boxes.

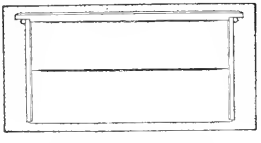

Fig. 19. Division Board.

A DUMMY, or division-board (Fig. 19), is often used in the brood chamber or body, to narrow down the space, in weak

colonies, by removing unoccupied frames for winter or early spring to keep the bees warm. In this way a large hive may be fitted to the needs of either a small or a populous colony.

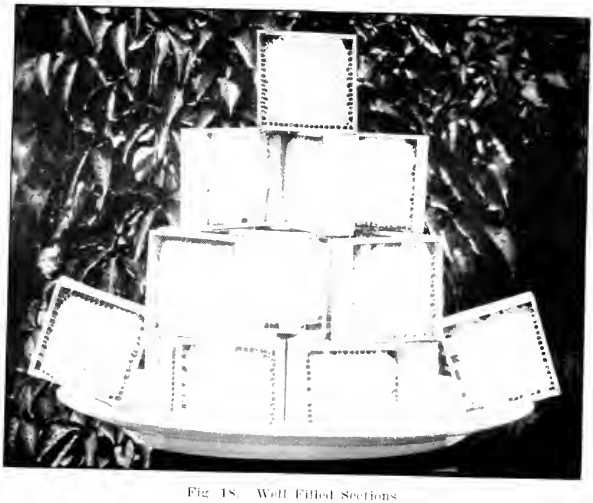

Fig. 18. Well Filled Sections.

In the spring or early summer, after several weeks of incessant laying by the queen, when thousands of young bees hatch daily and the combs of the hive can no longer accommodate its teeming population, the bees prepare for swarming, which is the natural way of increase, by building a number of queen-cells (Fig. 20) to replace the old queen who will leave the hive with the swarm, usually after the first queen has hatched. In some circumstances, however, the swarm leaves shortly after the building of queen-cells. During the warm part of a summer day, the bees rush pell-mell out of the hive, and soon cluster upon a tree limb, a shrub, or some other object, in close proximity. Allowing them fully to settle upon the spot selected by them, the apiarist gets a hive in readiness. If the limb upon which they hang is of no value, it may be gently cut down and the swarm may be carried quietly in front of the empty hive, which has been put in shape and slightly raised from its bottom board with wedges or blocks. The swarm is then shaken upon a sheet or cloth spread in front of the entrance. As they recognize the shelter offered, they enter it and call each other by the fanning of their wings, making a peculiar roar or hum. If the queen is with them the entire swarm will soon be housed. If she is missing, they will again take wing. With a little careful attention, she may be easily noticed, when present, and directed towards the new hive, for she is very heavy and flies with difficulty. If the limb upon which the swarm has settled is too valuable to be cut, the swarm may be shaken into a light box, a swarm catcher (Fig. 22), and carried to the hive. A very light amount of smoke may be used sometimes, but it should always be used sparingly so as not to frighten away any of the bees. If the swarm be on a trunk of tree or some other inconvenient spot, it may be drawn away by presenting to the bees a comb of brood or even an empty comb borrowed from another hive temporarily for this purpose. As soon as a few bees enter the hive and call the others, the entire swarm follows. In hiving bees, nothing but the

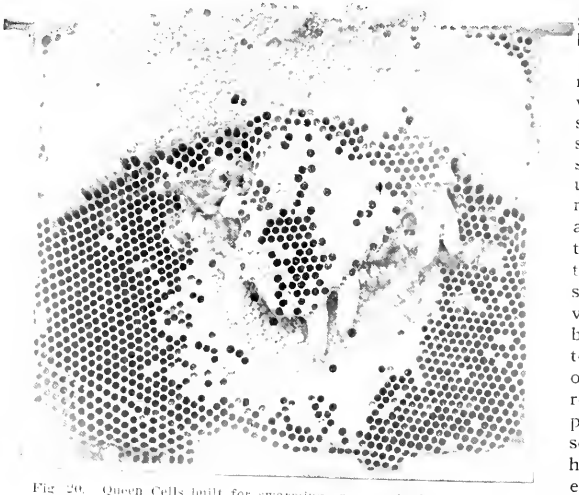

Fig. 20. Queen Cells built for swarming on a comb that was spaced too far from its neighbor.

Fig. 22. Swarm Catcher.

Fig. 21. A Pretty Swarm on a Limb.

body, bottom and cover should be used. The supers are put on only after the queen has begun her duties of laying eggs in the body. Otherwise, we might cause them to rear brood in the super, and this would soil the sections and darken their combs, making them unfit for sale. When numerous swarms are expected, in order to attract them to a convenient spot for clustering, a black stocking, a dry mullen stalk, a sumac head or a dry comb may be fastened in the most desirable place in full view, as they often alight on a dark object and cluster there. An empty hive in readiness is sometimes seized upon by them. If too much time elapses between the clustering of a swarm and the gathering of it by the apiarist, the scouts which have gone forward from the swarm, to look for a home, may return, and the swarm will then leave the spot and may be lost.

THE PREVENTION OF SWARMING

is often a failure, but by following the method hereafter mentioned, much swarming may be avoided: Keep your hives well shaded from the sun during the hot weather. If trees are absent, use some sort of roof over the cover. For a very small apiary, an open shed is good. Give plenty of ventilation. Bees should never hang out in clusters (Fig. 23) on the outside of the hive in the busy season. Additional room for ventilation by raising the hive an inch or two from its bottom and additional super space will usually secure constant activity during the working day, and will help avoid the issue of many swarms.

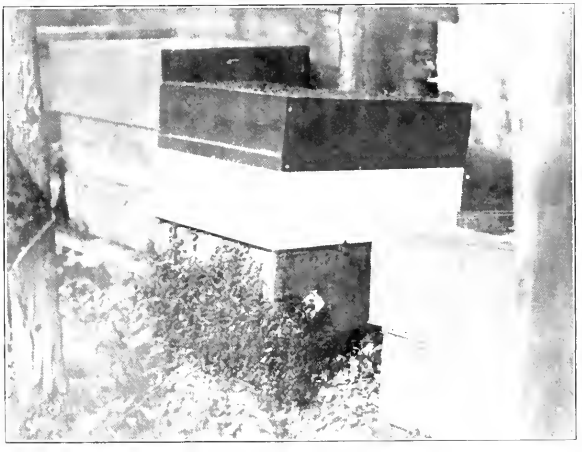

Fig. 23. Bees lying out. Too small an entrance.

Too many drones are also an inducement to swarm. These burly, noisy fellows are constantly in the way, during the honey crop. The removal of drone comb and replacing of it by worker comb in early spring will help keep down their numbers. If the drone comb was removed without replacing it with worker comb, and the bees allowed to build in the same spot, they would probably build drone comb again, so it is important to REPLACE drone comb with worker comb or comb foundation.

Lastly, if we produce EXTRACTED honey instead of COMB honey, and use very large hives, we will usually succeed in avoiding natural swarming, which is often undesired when the apiarist is absent during most of the time or has not the disposition to watch his colonies to gather the swarms.

It should be borne in mind, however, that there is no infallible method of preventing natural swarming. A queen and drone TRAP or a GUARD may be used, but those implements are very much in the way of the bees and are not liked by the practical apiarist.

ARTIFICIAL SWARMING or DIVIDING, when increase is wanted, may be resorted to in different ways, but the colonies must be very populous and this method of increase should be avoided by novices, as it is often overdone to the great detriment of the bees and the destruction of apiaries.

One colony may be built up from two others, which, for convenience, we will call A and B, and the new hive C. Open A and remove from it the queen and the comb of brood upon which you find her, placing these in the new hive or C, with a full supply of frames, provided with comb foundation or starters, ready for work. Now remove A from its stand and place C upon it. Remove B to a new spot and put A in its place. The field bees of A will come to C, and finding their queen there, will go to work as if nothing had happened, especially if the new hive is of the same color and shape. The bees in A are queenless and will at once proceed to raise a queen, unless you have prepared to supply them with one that you have either reared or purchased from a queen-breeder, in which case this queen should be in readiness and introduced at once. If they have to raise their own queen it is well to replace the comb that has been taken away with a comb secured from some other hive, as they would be sure to build drone comb. They always do this when they are queenless. Since they have the field bees of B. they are delayed but little. As to B, it has only lost its field bees, and within a week will be as good as ever.

During a good honey flow, bees from different colonies may be thus mixed without danger, as they will not fight each other. The harvesting of honey renders them peaceable. This is the safest method of making artificial swarms. Numerous other methods are given in the text books. In making divisions of this kind, we must bear in mind that the old bees always know their original location, and will return to it invariably unless we can compel them in some way to take full notice of the change or unless they have abandoned it voluntarily with a natural swarm.

QUEEN REARING is resorted to by the bees, whenever deprived of their queen by the apiarist or by accident. But they must have eggs or young brood less than three days old. Otherwise they are hopeless. A colony which is rendered queenless should be provided with such brood, always from the choicest colony in the apiary. ARTIFICIAL QUEEN REARING is carried on by specialists with selected colonies, but this question is outside of the limits of this pamphlet and the student should refer to books treating of this subject.

When queen bees are purchased, ITALIAN BEES should be given the preference, as they are uniformly liked for their higher qualities and gentleness. Other races have been tried, and among them the CARNIOLAN, but this bee is very similar to the common bee in appearance, not possessing the THREE YELLOW RINGS which are characteristics of the Italian. Purely bred bees are to be preferred, other conditions being equal.

THE PRODUCTION OF COMB-HONEY in the one-pound sections is carried on by the great majority of apiarists in the United States. The super containing sections to be filled, should not be placed upon the hive until the body is fairly well occupied by bees and brood, just at the opening of the honey flow, in early June usually, when white clover gets into full bloom. Partly built sections remaining from the previous year may be used as bait to draw the bees up into the super, provided those sections are clean.

When colonies swarm, this usually puts an end to the production of honey in their super. In that case, and if you wish to get as large a result as possible, you may follow this method: Remove your swarmed colony to a new spot, at the time when you gather the swarm and place the hive containing the swarm on the old stand. This will secure all the field bees to the swarm and within two days you may give this swarm the supers of the parent colony. This deprives the parent colony of so many bees that it may suffer if the weather be cool, so judgment must be exercised in this matter. Instead of placing it in a new spot, you may exchange it with another colony which has no supers to fill, so that it will secure its field workers.

In a very good honey crop, additional supers may be placed on a colony that is filling the sections rapidly, but this must not be overdone, as you run the risk of getting a large lot of unfinished sections, should the weather prove unfavorable and the crop of short duration. You cannot always predict a crop from the number of blossoms in the fields, and we have often seen a failure of honey production, due probably to atmospheric causes, when the pastures were white with clover bloom. The causes of honey production have so far remained unexplained. Two crops of honey, in June and August-September, are usually harvested in the Mississippi valley and the Lake region. After each of these crops it is

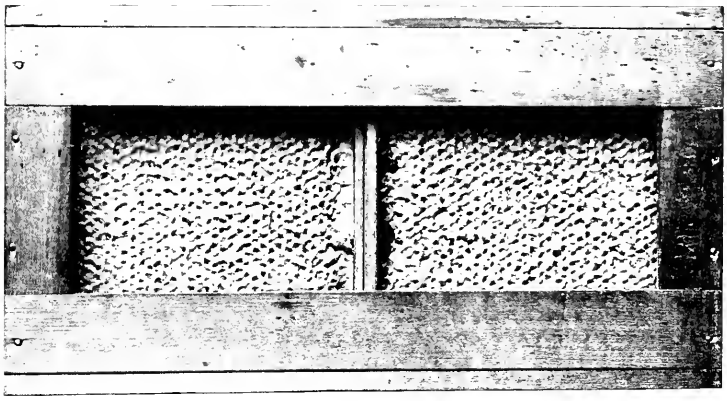

Fig. 24. Well Sealed Honey.

advisable to remove all filled sections to keep them from being travel-stained by the bees, who also add propolis of more or less dark color in corners and crevices, during the interval between the crops. The careful apiarist offers on the market absolutely clean sections of WELL-SEALED HONEY. (Fig. 24.)

THE PRODUCTION OF EXTRACTED HONEY

is generally carried on by using a two-story hive (Fig. 25), both stories being of same depth, although the author of this treatise prefers shallow supers over very capacious hive bodies. The honey is extracted by centrifugal action, by uncapping the combs with the UNCAPPING KNIFE (Fig. 26) and placing them within a HONEY EXTRACTOR (Fig. 27) in which they are revolved against a screen with enough speed to force the honey out against the sides of the can. The comb remains unbroken and may be returned to the bees, season after season, being every year better and stronger than before, for the bees add new wax to it each time. The bees being thus provided with combs already built from the previous season, much time and labor is saved and a much greater return secured. Were it not that extracted honey sells in the United States at a less price than comb honey in sections, the honey-extractor would be universally used, for a colony which is provided with empty combs ad infinitum is much

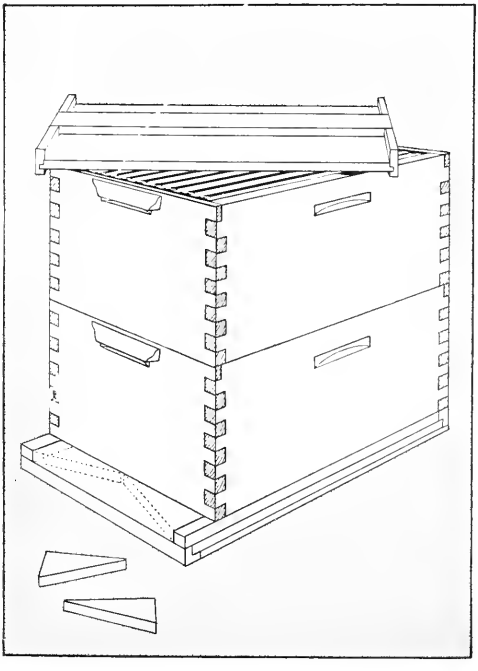

Fig. 25. 2-Story Hive for Extracting. With Two Full Depth Bodies.

Fig. 26. Bingham Uncapping Knife.

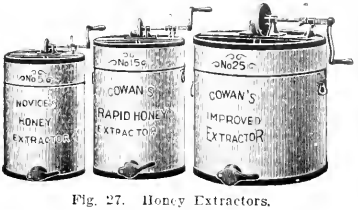

Fig. 27. Honey Extractors.

less apt to swarm than the one that is run for section honey and has to build all its combs. The supers for extracting are put upon the hives at the same time as for comb honey, but in greater number. The removal of them when full is not so urgent after the crop, because the appearance of the sealed honey has no importance in this case.

Extracting should not be done until the honey is well ripened; fresh honey contains a large per cent. of water, and often runs like water when handled. It would spoil readily if taken too soon. The bees ripen it and evaporate it while in the combs by active ventilation.

Extracting should be done within the honey-house away from the bees. If there is no honey in the fields, it is well to wait until evening to return the combs to the bees, for the smell of the honey induces ROBBING. When in possession of them, the bees at once repair the combs to refill them at the first opportunity.

ROBBING is one of the stumbling blocks of the business of bee-keeping. The morals of the honey-bees are sadly at fault, for as soon as they take flight in the spring and whenever there is a dearth of honey, the strong and wealthy colonies attempt to rob the weak ones or those whose stores are exposed in handling by the apiarist. Watch your weak colonies, especially those that have to be fed. A QUEENLESS colony, after winter, is in great risk of being robbed by the stronger ones, and it is usually best to unite it, some evening, to another colony, by carrying its bees, with the combs they cover, to the other hive, in which space has been prepared. If this is done in cool weather and a little smoke used until all are thoroughly frightened, they will be prevented from fighting and will unite peaceably.

Robbers are easily recognized by their sneaking, hurrying actions, and their shiny looks, due to their hasty slipping through cracks and crevices, in search of forbidden sweets. Healthy colonies are readily protected against their actions by narrowing down the entrance of the hive with a block of wood or a tin slide. But, in this matter, an ounce of prevention is worth a pound of cure. Sometimes a robbed colony which is worth saving may be protected by exchanging its location or stand with that of the colony which robs it. The robbing colony may easily be detected by sprinkling the robber bees with flour. It is then interesting to note the astonishment of the robber bees when they find their own home where they expected to find plunder.

To avoid robbing, do not keep honey or sweets exposed out of doors in times of scarcity. When the honey crop is on, THERE ARE NO LONGER ANY ROBBERS, for all bees prefer the fresh nectar of flowers to the best honey. When you see bees sneaking about the hives, examining the cracks, you may be certain that there is not much honey in the fields.

TO WINTER your bees successfully, first make sure that they have enough stores. An experienced bee-keeper can usually judge of the amount of stores by lifting the hive. In that case, account must be taken of the age of the combs. Very old combs may add to the usual weight of a hive ten pounds or more, without containing honey. Twenty-five pounds of honey, at least, is necessary to winter bees out of doors. They may be wintered with less in the cellar, but in that case additional feed will be necessary in spring to rear brood. INDOOR wintering should be the rule north of the 42d degree, in the Mississippi valley and Lake region. OUTDOOR wintering should be the rule south of the 40th degree. Between these two latitudes, much depends upon more or less favorable conditions of shelter.

INDOOR WINTERING is best in a dry cellar or in a well-made silo. The requisites are ventilation, a regular temperature of about 40 to 45 degrees and quietude. Dark quarters are much the best, though not indispensable. Put the bees in immediately during the first brisk cold in November. Take them out on a warm day of March, when the first soft maple blossoms are out. (Fig. 28, next page.)

OUTDOOR WINTERING is most successful with well sheltered locations, sufficient ventilation at the bottom, and moisture absorbents over the brood combs, such as old woolen carpets, bags full of chaff, forest leaves, etc. Snow is not injurious if it does not thaw and freeze at the entrance and intercept ventilation. A hive buried in snow in zero weather is well sheltered. Should a warm day come, the snow must be removed from the front. A very good winter shelter consists in building paper or tarred paper wrapped about the hive. (Fig. 29.)

The rules given above for wintering are not infallible, for winters are very irregular in this climate; but if the colonies are strong, the honey of good quality, being neither

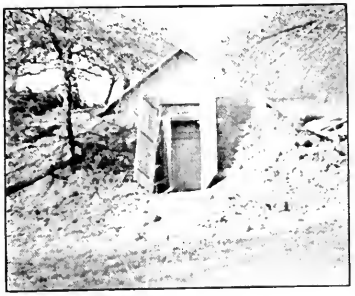

Fig. 28. A Bee Cellar

Fig. 29. Paper Cover with Winter Case and Chaff Cushion

honey-dew nor fruit juices, which are sometimes gathered from decaying fruit in bad seasons, the bees will stand a very long cold spell.

FEEDING should be resorted to only when the bees have an insufficient amount of winter stores, or in spring when the blossoms are delayed, or during the interval between the fruit bloom and the white clover crop, as they breed heavily at that time and consume a great deal. Bees may me found starving even when there are blossoms in the fields, if the weather is not favorable to the secretion of honey. Allowing them to starve at such time is worse than killing the hen that lays the golden eggs.

Feeders of all kinds are to be had. The best are those which place the food nearest to the brood and the farthest from the entrance. Do not feed any unknown honey, no matter how good it may appear, for it may contain germs of bee diseases which are harmless to human beings, but death to the bee-larvae. Feed honey from your own bees or from some other known source, or feed sugar syrup made by diluting two pounds of the best granulated sugar in one pound of water; sugar candy made like the popular "fudge" and placed over the combs, is also good winter food. For spring, the liquid food is best, especially if warm.

In feeding your bees and in all the other manipulations of the apiary in times of scarcity, avoid attracting robbers, especially if the colony is weak. If the robber, who flies about the hive in a quick, sneaking, nervous way, can gain admittance, it will carry away the stores and bring others from its own hive until the colony is

Fig. 30. In the Snow in Midwinter

overpowered. A short method to protect a hive from robbing when it is threatened and has been fed or handled, is to throw a bunch of fine grass over the entrance. In this grass the guards of the hive can readily seize and frighten the robbers. If feeding is done in the evening, the bees are less apt to be annoyed by robbers and have time to put the food away in the cells, where it gives less smell and is safer. Syrup attracts robbers less than honey. Combs of honey from rich colonies exchanged for dry comb of destitute colonies are very useful for feeding.

DISEASES OF BEES are few. Those of the adult insect consist first in DIARRHEA, which is caused by thin or unhealthy honey consumed in very cold, long winters. It is rare, but has been known to destroy entire colonies. The best way to prevent it is to have none but good, ripe honey in the combs for winter.

Another disease of the adult bee is the MAY DISEASE, also called PARALYSIS and CONSTIPATION. The bee crawls about in misery with loaded and fetid bowels, and sooner or later dies. This usually disappears at the opening of the crop. It is uncommon and rarely destroys entire colonies.

The worst of all bee diseases attacks th brood and is called FOULBROOD. (Fig. 31.) The true, malignant, contagious foulbrood is readily recognized, when sufficiently advanced, by three positive signs: the ROPINESS of the decayed matter; when you insert a small stick into it, it stretches into ropy or rubber-like filaments: the COFFEE COLOR, the larva is at first whitish, then yellow, and afterwards of a dark brown color: the GLUE POT SMELL, this is usually noticeable only when the disease is far advanced. Foulbrood is due to a fast reproducing microbe called "bacillus larvae" (by some "bacillus alvei"), whose spores are readily transported from hive to hive by the bees or by the apiarist, most especially in the honey. Luckily, it is infrequent, the writer having kept bees for forty years before he saw a single case. But owing to its rapidity in reproducing, it should be fought with the utmost vigor, as colonies attacked by this disease soon die out. Modern bee-keeping tends to increase its spread, owing to the frequent shipping of honey, bees, queens, etc., from one part of the country to another.

TO CURE FOULBROOD, open the hive in the evening, preferably at the beginning of the honey harvest, when there are no robbers about, remove all the bees by shaking them on a sheet of paper or oil-cloth, in front of a clean, empty hive with only foundation starters in the frames and located on their own stand. Leave them three days without combs or food, so they may use up the honey within their stomachs. At the end of that time transfer them again into a hive containing sheets of foundation. The combs of the old hive should be melted into wax and the wax and honey heated thoroughly and kept about the boiling point of water for an hour. The brood should be burnt up. It is best to singe the inside surface of the old hive, body, bottom, cover and frames, by coating them slightly with oil and allowing the flames to cover them for a few seconds. Better yet, they may be singed with a tinner's or painter's gasoline torch. The operator should carefully cleanse his hands and all instruments after each operation. By following this method foulbrood is suppressed

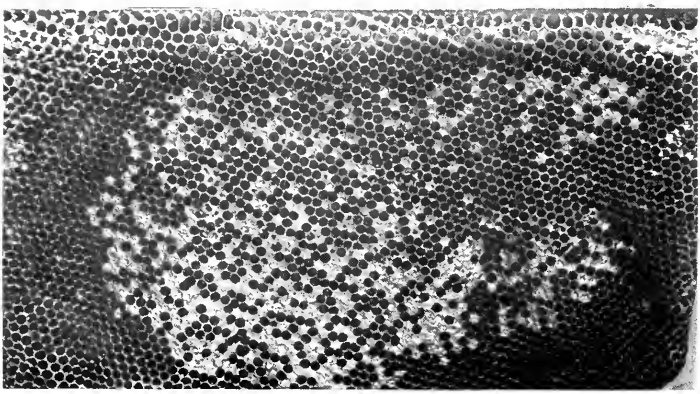

Fig. 31 American Foul Brood

before it has had time to spread. If there is no honey in the fields, the bees, of course, should be fed.

Another form of foulbrood, called "BLACK BROOD" or "EUROPEAN FOUL-BROOD," in which the symptoms are slightly different, the ropiness less apparent, may be cured by removing the queen or caging her so as to allow the bees to clean out all dead brood. Shortly after the last bees have hatched, or in about thirty days, the queen may be released or a new queen given. By that time the disease is usually overcome. But this is impracticable in the true ropy foulbrood, because the bees can never clean out all the dead larvae. Even if they did, it is well proven that such combs perpetuate the disease, unless strong antiseptics are used, which the average operator cannot afford to bother with. In either of these diseases, the seals or caps of the cells containing dead larvae are punctured or sunken. A very mild form of disease of the brood is called PICKLED BROOD. Some larvae die, but usually dry out so that they may be shaken out by inverting the combs. It is unimportant. Unimportant also is chilled brood, that has been killed by accidental exposure to cold, or starved brood, which has died for lack of sufficient food.

The BEE-MOTH has been considered a very dangerous enemy of bees. But modern methods have proven that this insect cannot harm healthy, strong colonies of bees. Like the carrion flies that lay eggs in the body of dead or dying animals and produce maggots by the million, the bee-moth is a predatory insect which lays eggs in the combs of weak or queenless or dead colonies. Its larvae grow and feed upon the cocoons, wax, propolis and detritus of old hives. If your colonies are strong, your bees have nothing to fear from the moth. If you wish to preserve empty combs or combs of honey, free from moths, keep them in a well closed box after having burned a little brimstone, in a dish or crock, within the box. Or use a few drops of bisulphide of carbon on a rag or in a saucer within the box. This drug is inflammable and should be used with care. The burning of brimstone within the honey-room in a dish, in quantity sufficient to kill the flies, will destroy the moth. Neither their eggs, nor the winged insect can stand the winter in a room where the temperature gets down about zero. The only way in which the bee-moth perpetuates in this climate is by an occasional larva escaping the vigilance of the worker bees, in some warm nook of a populous hive, or by the apiarist keeping some combs over winter within the walls of a warm house.

THE PROPER HANDLING OF HONEY both in removing it from the hives and preparing it for sale, is of great importance. Do not use smoke in large amount over the combs that are to be removed, for it taints the honey perceptibly, especially if strong, like tobacco smoke. Use just enough to handle the bees safely. A case of comb honey raised off the hive and laid carefully down upon a bottom board close at hand, may be covered with a sheet. The bees will leave it promptly and return to the hive, crawling out from under the sheet. No occasion should be given them to come back, however, as they would sooner or later carry all the honey back to the hive.

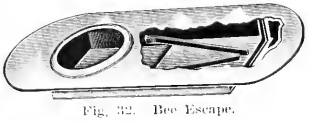

Fig. 32. Bee Escape.

BEE-ESCAPES (Fig. 32) are very handy in removing bees from either extracting supers or section supers. They are placed in a special HONEY-BOARD (Fig. 33) which is inserted between the body and the super of the colony, in the evening preceding the intended removal of the honey. Care must be taken not to leave any crevices through which robber bees might pass in or out, since most of the inmates will have left the super without defense against intruders from without. The only possible danger in the use of bee-escapes is in very hot weather, in a hive exposed to the rays of the sun when the super, which has no room left for ventilation, except through the very small opening in the escape, may be subjected to a temperature high enough to break down the combs. Outside of this possibility, the bee-escape is highly commendable for the removal of honey.

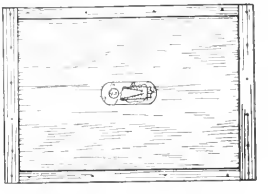

Fig. 33. Escape in Honey Board.

Fig. 34. Separator.

SEPARATORS (Fig. 34) between the sections, whether of wood or metal, are necessary if you wish to produce fancy honey which may be handled or crated without danger of scratching the surface of the combs. When separators are not used, the sections must be placed within the SHIPPING

CASES in the same position as they were built, so that inequalities in the combs may fit in their proper places. But in the production of extracted honey, or if you wish to raise comb honey only for your own consumption, separators are not desirable, for they are impediments to the free action and ventilation within the hive.

For the above reason, queen-excluders, to keep the queen out of the supers so that she may not lay eggs in those combs, bee-entrance guards and queen and drone-traps to keep the queen from leaving the hive and to destroy the drones as they emerge, are not to be recommended unconditionally. But, these contrivances are used by many people, nevertheless; if removed as soon as no longer needed, they prove useful in some cases.

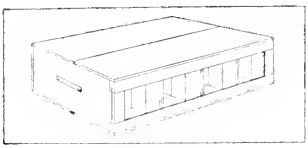

Fig. 35. Shipping Case.

SECTION HONEY is put up in SHIPPING CASES (Fig. 35) with glass on one side and paper at the bottom to keep dripping honey from running out. The sections along the glass should be a fair average sample of those within. It is neither profitable nor fair to misrepresent.

EXTRACTED HONEY is kept in tanks or barrels until the end of the warm season, when it should be put up for sale at retail before it GRANULATES. In JUNE HONEY, granulation takes place about the first of September, and in FALL HONEY by the end of November. This is the rule, but not without exception. Honey which has been harvested too soon, is sometimes watery. Some of its water may be evaporated during the summer by keeping it in a very warm, dry room, but it is far best to delay harvesting until it is fully ripe and thick.

Square cans, glass jars, tin friction top pails, are the most serviceable packages for extracted honey. No impurities should be allowed in the retail packages. Honey is very heavy, twelve pounds to the gallon, and all impurities, such as broken particles of comb, bees, etc., rise to the surface, and should be skimmed off previous to bottling.

Granulated honey may be liquefied by slow heat, but as this product contains very volatile essential oils, from the blossoms, which give it its fine flavor, and as it may be scorched readily, it should never be heated over a direct fire. Over water, or in a water bath with the temperature of the water BELOW THE BOILING POINT, honey will melt until it has regained its liquid form, and will after this be slower to granulate again. Very ripe and thick honey granulates in soft, butter-like grains. Honey that is more or less unripe, granulates in lumps like sugar, with watery particles about the lumps. Such honey will improve by being melted properly, as it will evaporate more or less of the watery particles.

There is no such thing (and there never was) as artificial comb honey. The making of comb foundation, the base of the honey-comb, from pure beeswax, used as guides in frames and sections, gave rise to the story of artificial comb honey, the making of which would be beyond the power of man. COMB FOUNDATION secures straight combs, worker combs, saves the bees immense labor, is made of their own product and has come to stay. It is used in full sheets; sometimes in the brood chamber it is strengthened with light wires imbedded in it. Care should be taken in giving it to natural swarms, as they may hang upon it and break it down with their weight before they have fastened it sufficiently. It is best to alternate it with built combs to lessen the load.

Narrow sheets of comb foundation, used to guide the bees, and hung to the ceiling of either sections or frames, are called STARTERS. They are indispensable to secure straight combs. In sections some apiarists use a triangular sheet hanging from the ceiling and a very narrow strip at the bottom. This causes the bees to fasten the comb at the bottom as well as at the top, and insures safer transportation, for a comb which is fastened only to the top is very easily broken out. Full sheets in sections are, of course, preferable.

To begin in bee-culture, it is not advisable to buy more than from two to five colonies of bees until you learn how to handle them and make sure that you will enjoy working with them, for a neglected apiary is worthless. Colonies or swarms may usually be bought cheaper near home than by sending away for them, owing to the expense of expressage. If you buy full colonies, try to make your purchase a little before fruit bloom, as at this time they are lightest and can be most easily transported.

Inspect the inside of the hives, selecting those that fly the strongest, and make sure that they have healthy brood in the combs. As a matter of course, you will buy bees in movable frame hives, for it is quite a task for a beginner to transfer bees, and bee-keeping is out of the question without movable frames at the present advanced stage of the pursuit.

If you have to move the bees but a short distance, you will have no difficulty, by simply nailing a wooden block before the entrance and making sure that the bottom board and cover are fastened down so they cannot be removed by jar. We usually tack a cleat over them. Move the hives during cool weather or at night. If you must wait till warm weather, then remove the cap and tack a sheet of wire cloth over the frames and keep the hive in the shade until they are released. When you place them on the spot which they are to occupy, release them, and at the same time blow a little smoke in at the entrance. This is necessary if they have traveled but a short distance, as they may be irritated. But if they have been confined and carried for quite a distance, they will be frightened so as to be harmless. Yet it is a good precaution to smoke them a little. Place some sort of obstruction across their flight, such as a slanting board leaning over the entrance, or anything which will not prevent them from going out, but will make a very plain impediment to their starting out—as they are accustomed to do—in a bee line from the entrance. By this means you compel them to take notice of the fact that their surroundings have been changed: each bee as it flies out will recognize the spot. Thus you will avoid the risk of losing a great many who would otherwise fly straight out and be unable to return.

THE APIARY

Put your bees in a sheltered spot, as much as possible facing south, southeast or southwest. A northern exposure has always proved detrimental with us. If your bees can be sheltered by a board fence from the hard winds, so much the better. But the ideal location is on the south slope of a hill.

Bee-culture will succeed almost anywhere, but a country with plenty of white clover pasture and orchards, and with low, moist fields where the persicarias (commonly called heartsease), golden rod, spanish needles and asters are to be found in abundance during the fall months, will prove good for honey production. Sweet clover, alfalfa and many wild flowers are also good honey producers.

Place your bees in the shade of some shrubs, under apple trees or cherry trees. Tall shade trees will do if you are not afraid of climbing after swarms, or if you keep your bees in very large hives from which they will swarm but little. It is well to have a good foundation for each hive, by using either bricks or oak blocks. A few cinders will keep the weeds and grass from growing in front of the entrance.

TRANSFERRING

BEES FROM COMMON TO MOVABLE-FRAME HIVES. This process may be easily affected whenever the weather is warm enough for bees to fly. It has sometimes been done in winter for purposes of experiment, by removing the bees into a warm room, but the best time for it is when the bees have the least honey, at the beginning of the fruit bloom. If it can be done on a warm day, when they are at work, there will be but little danger from robbers.

It is conducted as follows: Have in readiness a box—which we shall call the forcing box—whose diameter is about the same as that of the hive from which you intend to drive the swarm. Smoke the hive, lift it from its bottom-board without the slightest jar, turn it over and carefully carry it off about a rod, as bees, if undisturbed, are much more inclined to be peaceable, when removed a short distance from their familiar stand. If the hive is gently placed upside down on the ground, scarcely a bee will fly out, and there will be little danger of being stung. The timid and inexperienced should protect themselves with a bee veil, and may blow more smoke among them, as soon as the hive is inverted. After placing it on the ground, the forcing-box must be put over it. If smooth inside it should have slats fastened one-third of the distance from the top, to aid bees in clustering. Some apiarists place the box slanting on the hive, so as to be able to see the bees climbing. This method, called open driving, is a little slower, but it may give the operator a chance of seeing the queen; when the driving can be considered as done.

As soon as the apiarist has confined the bees, he should place an empty hive—which we call the decoy-hive—upon their old stand, which those returning from the fields may enter, instead of dispersing to other hives, to meet, perhaps, with a most ungracious reception. As a general rule, however, a bee with a load of honey or bee-bread, after the extent of her resources is ascertained, is pretty sure to be welcomed by any hive to which she may carry her treasure; while a poverty-stricken unfortunate that presumes to claim their hospitality is, usually, at once destroyed. The one meets with as flattering a reception as a wealthy gentleman proposing to take up his abode in a country village, while the other is as much an object of dislike as a poor man, who bids fair to become a public charge.

If there are in the apiary several old colonies standing close together, it is desirable, in performing this operation, that the decoy-hive, and the forcing-box, should be of the same shape and even color with that of the parent hive. If they are very unlike, and the returning bees attempt to enter a neighboring hive, because it resembles their old home, the adjoining hives should have sheets thrown over them, to hide them from the bees, until the operation is completed.

To return to our imprisoned bees: their hive should be beaten smartly with the palms of the hands, or two small rods, on the sides to which the combs are attached, so as to run no risk of loosening them. These "RAPPINGS," although not of a very "spiritual" character, produce, nevertheless, a decided effect upon the bees. Their first impulse, if no smoke were used, would be to sally out, and wreak their vengeance on those who thus rudely assail their honied dome: but as soon as they inhale its fumes, and feel the terrible concussion of their once stable abode, a sudden fear that they are to be driven from their treasure, takes possession of them. Determined to prepare for this unceremonious writ of ejection, by carrying off what they can, each bee begins to lay in a supply, and in about five minutes, all are filled to their utmost capacity. A prodigious humming is now heard, as they begin to mount into the upper box: and in about fifteen minutes from the time the rapping began—if it has been continued with but slight intermissions—the mass of bees, with their queen, will hang clustered in the forcing-box, like any natural swarm, and may, at the proper time, be readily shaken out on a sheet in front of their intended hive.

Now put the forcing-box on their old stand and carry the parent-hive to some place where you cannot be annoyed by other bees.

It is important to make sure that the queen is removed, as she might be injured in the transfer of comb. Her presence among the driven bees can be ascertained in a few minutes by the quietness of their behavior, or by the eggs which she drops on the bottom board, and which can easily be seen if a black cloth is spread under the forcing-box.

If the queen is not with the bees, a few will come out and run about, as if anxiously searching for something they have lost. The alarm is rapidly communicated to the whole colony: the explorers are reinforced, the ventilators suspend their operations, and soon the air is filled with bees. If they cannot find the queen, they return to their old stand, and if no hive is there, will soon enter one of the adjoining colonies. If their queen is restored to them soon after they miss her, those running out of the hive will make a half-circle and return: the joyful news is quickly communicated to those on the wing, who forthwith alight and enter the hive: all appearance of agitated running about on the outside of the hive ceases and ventilation, with its joyful hum, is again resumed.

If the queen has not left the old hive, it is safer to return the bees and to resume the driving at another time.

To transfer the comb, have on hand tools for prying off a side of the hive: a large knife for cutting out the combs: vessels for the honey: a table or board on which to lay the brood combs: and water for washing off, from time to time, the honey which will stick to your hands.

Have also a number of pieces of wire, No. 16, cut a little longer than the frame, and bent on the ends in this shape ⌊‾‾⌋, to be driven into the wood of the frame and to hold the combs in place. Let a certain number of frames be in readiness, with three or four of these wires fastened on one side, and lay them on the table, WIRE-SIDE DOWN. You must also have your movable frame hive in readiness near the table, with an extracting pan under it instead of a bottom board, to receive what honey may drip. All this must be ready before disturbing the bees.

Having selected the WORKER-COMBS, carefully cut them rather large, so that they will just CROWD into the frames and retain their places in their natural position until the bees have time to fasten them.

Now tack as many wires over them as may be necessary to hold them securely, and hang them in the hive. DRONE COMBS SHOULD BE INVARIABLY MELTED INTO WAX. If drone-brood is found, it can be fed to young chickens, who are very fond of the larvae. The bottom board should be put under the hive just before carrying it out.

When the hive is thus prepared, the bees may be put into it and confined, water being given to them until they have time to make secure against robbers.

If there is danger of robbers, it is preferable not to put the bees into the hive till late in the afternoon. They should be shaken in front of the new hive on a sheet like a natural swarm.

When the weather is cool, the transfer should be made in a warm room, to prevent the brood from being fatally chilled. An expert apiarist can complete the whole operation —from the driving of the bees to the returning of them to their new hive—in about an hour, and with the loss of very few bees, old or young.

When transferring in early spring, it should be remembered that the worker-brood is of great value, and not the least bit of it should be neglected or wasted unnecessarily. After a week or more, according to the season, the hive may be opened and the fastenings removed.

Let not the novice, however, think that transferring bees is a task that requires but little skill. He who transfers successfully a large number of colonies may be called an expert in handling bees.

HORTICULTURE AND BEE-CULTURE

Bees are beneficial to fruit blossoms, which they help to fertilize by going in them in search of pollen. It is by the agency of insects that fruits are often made most abundant. Spraying will not injure the fruit or poison the bees if it is done after the blossoms have fallen, and this is the only time when fruit trees should be sprayed to kill the injurious insects, such as the codling moth.

When you produce honey, do not rush it off to the large cities, but be sure and supply your home market first. The writer has known apiarists to ship their honey to a commission man who reshipped a part of it right back to the grocer in the immediate vicinity of the producer of that honey. Honey is good and wholesome. It is an already assimilated food, and for that reason is far superior to sugar or fruits for the invalid, but it should be used in reasonable quantities. Those whose stomachs will not accept honey may learn to use it by beginning with very diminutive doses. The slight amount of acid contained in the honey is the only cause for its rejection, but when once the stomach is accustomed to it, it will be found the most digestible food taken.

To change the breed of your bees you may buy some queens of such breed as you see fit to select. Upon receipt of the queen purchased, remove the queen of your colony and insert the new queen. A good method of introduction is usually printed on the mailing cage which contains the queen. If this is done in the early part of the season you will see the worker progeny entirely changed before fall, for in the busy season the worker bees do not live on an average over forty days. A good queen will last three years and sometimes four or five years, but the bees will usually rear a new one from her brood before she dies.

Beware of making inventions in bee-culture until you have mastered the subject.

MELTING COMB INTO BEESWAX

If the combs are old and dark put them in a tub before melting, fill the tub with cistern or soft water, keep the combs for about twenty-four hours under water, by some boards loaded with stones or bricks. The water will dissolve the impurities and by moistening the cocoons left in the cells by the larvae, it will prevent them from absorbing wax. Then, after draining the water out, melt them slowly with clear water in a copper or tin boiler. This method will give you a larger quantity and a better quality of beeswax than any other.

We recommend the HERSHISER WAX PRESS for melting combs.

The melted wax should be poured into flaring vessels so as to be easily removed when cooled.

INSTRUCTIONS TO BEGINNERS

WINTER.

1. To winter bees successfully out of doors, shelter them from north winds and keep them in a dry place, a little above ground.

2. To winter bees indoors, they should be kept at a temperature of 40 to 45 degrees, in quietude and darkness.

3. A room or garret, where the temperature varies, is a bad place to winter bees, in confinement.

4. Twenty-five pounds of honey is required to winter a colony of bees and help them to breed early in spring.

5. Do not keep your bees confined to the hive on warm winter days.

6. Prepare your hives in the winter and make them large. A large hive can be reduced in size by the help of a removable division-board, but a small hive cannot be enlarged and is not suitable for the use of a very prolific queen. Make all hives and frames of uniform size.

SPRING.

7. Spring is the season when the bees are most in danger of starvation and dwindling. Watch your colonies, feed the destitute till the honey crop opens, and lessen the room by means of a partition board, increasing the space as it is needed.

8. If you have to feed, do not feed at the entrance or out of doors, as it would teach bees to rob. Feed in the hive above the brood.

9. When you transport bees, do not hitch the horses until the bees are on the wagon. Unhitch before unloading.

10. When you see many bees hunting around nooks and corners, you may be sure there is some robbing going on somewhere.

11. One bee in March is worth ten bees in June, as it is the early bees that help to breed the large swarms. So make things convenient for your bees early in the season; supply them with water close at hand and flour in place of the pollen which they cannot get yet. The flour must be packed in a lump in an open box exposed to the sun. An old comb or a little honey is used for bait.

12. Two drones cost as much to raise as three working bees, and after they are raised they keep on eating, while the workers labor for you.

13. In the early spring remove the drone comb and replace it with worker comb or comb foundation, as much as in your power. You will always leave more drone comb than needed, and every square foot of drone comb replaced by worker comb is equal to a dollar saved.

14. Remember that comb costs the bees about ten pounds of honey for every pound of comb. So if your honey is worth 10 cents per pound, worker comb or comb foundation is worth to you $1.00 per pound. This is why the business of foundation making has taken such great proportions. Every man who uses it doubles his investment.

15. The use of comb foundation not only saves a great deal of labor and time to the bees, but it also secures straight combs in the frame and does away with the over-production of drone comb.

SUMMER.

16. The honey harvest lasts but a few days, or at most a few weeks, so you must be ready for it. Make hay while the sun shines.

17. One pound of comb honey, neatly put up in a clean case, is worth as much as two pounds slovenly put up, and is a recommendation for the producer.

18. If you raise comb honey only for your own use, it will pay you to raise it in large frames 6 inches deep and the full length of the hive. If you raise it for sale, it should be raised in one-pound sections.

19. If you raise honey and extract it from the comb so as to return the empty combs to the bees to be filled again, you will raise twice as much after you have a sufficient supply of empty combs to keep your bees at work.

20. It pays to have an extractor and use it, if you own but four hives of bees.

21. Honey should not be extracted when first harvested, as it is watery, unripe, and will sour. Give the bees time to ripen it and keep them at work with sufficient room.

22. When bees are hanging out in front of the hive, it shows that they are uncomfortable in it or have no room. They should be given more air, more shade or more room, according to the circumstances.

23. When hiving a swarm, give them a hive full of worker-comb or comb foundation, if possible, or else give them only narrow strips for guides, but do not give them a hive partly filled with comb, as they would be sure to build a great deal of drone comb in the remaining place. It is at this time that bees build comb most readily, as they are in the best condition to produce wax.

24. If you give your bees a good supply of empty combs before the beginning of the honey crop and keep them at work, they will rarely swarm. But if they once find themselves crowded and get the swarming fever, nothing will keep them from swarming.

25. When making artificial swarms, raise your queens and drones from the best colonies.

26. A queenless colony will raise queens at once, if it has larvae less than three days old, and these queens will hatch within 10 to 12 days.

27. The old queen always goes with the first swarm, unless she is unable to fly.

28. Make but a limited number of swarms, and make them strong and early. Late natural swarms should be returned to the parent hive about twenty-four hours after hiving them.

29. The colonies that work freely on red clover should be used as breeders in preference to others, as the tongues of their bees are evidently longer.

FALL.

30. Do not take too much honey from your bees. Remember that it is their surplus you should take and nothing else. Do not kill the cow to get the milk, or the hen to get the egg.

31. When you open a hive of bees, if you see any robber bees flying about, you may be sure that there is no honey in the fields, and you must avoid leaving the hives open, or exposing honey in their reach.

32. A robber bee is easily recognized by its quick motions and sneaking ways.

33. All bees will become robbers if tempted with exposed sweets in time of scarcity.

34. Decrease the size of the entrance of your hives when the honey crop is over, but be sure and have it very large during the honey crop.

35. Bees will not work on fruit juice when there is honey in the fields, and they cannot injure sound fruit at any time. If any of you doubt this statement, put a bunch of sound grapes, or a sound peach, in a hive of bees, and note the result 24 hours afterwards. It is birds and hornets that damage sound fruit. Bees only gather the lost juices.

36. In seasons of scarcity your bees should be fed. You will have such a season once in ten, and the busy little things will repay you fully the following year.

37. Honey-dew and fruit juice are bad winter food and should be extracted from the combs. When you have to feed, if you cannot get good honey, use good sugar syrup mixed with some honey.

38. If the bees have to be fed in winter, the food should be given them before the opening of cold weather.

SUNDRY ADVICES

39. Do not watch for bee moths, but keep your colonies strong and healthy, and they will take care of the moths.

40. A good bee smoker and bee veil are indispensable to an apiarist. Some people do not use veils, but they occasionally get stung on the face, and this is not very pleasant.

41. Smoke the bees at the entrance a little before opening a hive.

42. Do not handle your bees early or late, or in the night. On the contrary, select the warmest part of the day, as the old bees are then in the field.

43. When you are stung do not lose a second, but scrape the sting off. Do not pinch it off, as you are more than likely to drive more poison into the wound. A sting instantly removed gives but little pain comparatively.

44. There is more profit with less labor in 300 hives of bees than in 160 acres of land, but you should know what to do and do it in time.

45. There are about 5,000 bees in a pound. A gallon of honey weighs 11 to 12 pounds, according to its density. The cells of the worker bee measure about 5 to the inch, from wall to wall, those of the drones about 4 to the inch. There are about 27 worker cells or 18 drone cells on each side of a square inch of comb.

BEE-CULTURE VERSUS POULTRY RAISING

Poultry is raised by the masses. The large or small farmer, the horticulturalist, the market-gardener, the suburban, especially if a man of small means, but often even when he has large means, the clerk, the doctor, the minister, the widow of small income, all raise poultry, unless they are living within the limits of thickly populated districts or unless their revenue is sufficient to make them careless of small earnings like the home production of eggs and chickens.

Bee-culture is not followed by more than one in a hundred among poultry raisers, but is nevertheless a very practicable and economical adjunct, in similar conditions. A small back yard in any suburb may be used for a few hives right among the chickens. It is sufficient that the hives be placed in a shed or on a stand at an elevation of a few feet above the chicken yard, so that the chickens should be unable to jump on the hives, which they would soil more or less, besides the danger of their angering the bees by the jar. Neither should the hives face too directly into the chicken yard, unless it be so they may fly above it. The writer has often seen bees kept right among the chickens, and they seemed to learn at their first flight that the poultry were not to be considered as enemies.

With a large back yard or only a flat roof, in the thinly populated suburbs of even as crowded cities as St. Louis or Chicago, large apiaries may be kept, very profitably. We know of a gentleman who has thus kept as many as 85 colonies and harvests thousands of pounds of honey, which readily retail among his neighbors at good prices, as customers in his vicinity know that he raises the honey himself and have confidence in its quality, for that very reason.

Without aiming at such large results, the owner of a small home, anywhere in the reach of pasture lands, vacant lots covered in summer with a growth of white clover, sweet clover or melilot, heartsease or smart weed, Spanish needles or other wild blossoms; where fruit trees may be found in small numbers in every yard, or near a dairy or a park, such a party, man or woman, may easily add to the annual income, by keeping a few hives of bees. Very few industries require so little capital. As you have invested a few dollars in chickens and erected a little shed for them, you invest a few dollars in a couple colonies of bees of good breed and in sound movable-frame hives, a smoker, a bee veil, a hive tool. The total cost does not need to exceed $15.00 and you are sufficiently equipped for the beginning. Do not think of buying an extractor or other implements until the first crop begins to show in the super. But be sure to buy some literature, a good book, for you must be informed in the theory if you wish to succeed in the practice. Do not be afraid of handling your bees and examining them, provided you don't expose the brood to the cold air or the combs to robber bees. If they are carefully looked after, supplied with room

A City Apiary.

when needed, a little syrup when they are short of stores—which may happen ever at the opening of the honey harvest, kept well sheltered from the hot sun or the coldest weather, they will give you much greater proportionate returns than any similar sum invested in poultry, considering the amount of labor, for they need no morning or evening feeding, no weekly cleaning of the coop, but take care of themselves in all ordinary circumstances. In other words, they work for you and board themselves, if they are only given a chance.

If you must be away all day at your occupation, even during swarming time, arrangements may be made by which absconding swarms will be but a remote possibility. If you should occasionally lose a swarm, there will still be very satisfactory returns from your little pets.

Of course, care must be exercised not to anger the bees and cause them to sting the neighbors, but should such an accident happen, remember that the gift of a pound or two of honey will do more to smooth such wounds than the most urbane excuses. However, the accomplished bee-keeper does not have cross-tempered bees, for he learns how to handle them properly at the start, and those who have carefully read this little pamphlet know how it may be done without exertion.

A word, in closing, to the school teacher. There is no business which a teacher may undertake, more fitting than bee-culture. Nearly all of the bee work is needed during the vacation months, from May to October. Many teachers have an inadequate salary and see mature age coming with an impossibility of gathering a decent bank account. Earnings may be made during the summer months, equal to the salary of the entire school term, on a small plot of land, through bee-keeping.

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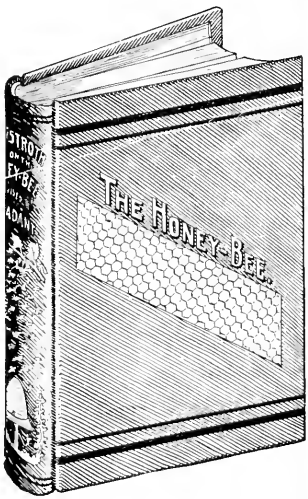

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